

## Claims

1. A surface treated steel sheet for a battery case in which a diffusion layer of a nickel-phosphorus alloy is formed at a surface on the inner side of the battery case.
2. A surface treated steel sheet for a battery case in which an iron-nickel diffusion layer is formed as a lower layer and a diffusion layer of a nickel-phosphorus alloy is formed as an upper layer at the surface on the inner side, and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer at the surface on the outer side of the battery case.
3. A surface treated steel sheet for a battery case in which an iron-nickel diffusion layer is formed as a lower layer, a nickel layer is formed as an intermediate layer and a diffusion layer of a nickel-phosphorus alloy is formed as an upper layer at the surface on the inner side, and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer at the surface on the outer side of the battery case.
4. A surface treated steel sheet for a battery case according to any one of claims 1 to 3, wherein the diffusion layer of the nickel-phosphorus alloy contains  $\text{Ni}_3\text{P}$ .
5. A surface treated steel sheet for a battery case according to any one of claims 1 to 4, wherein the thickness of the nickel-phosphorus alloy is within a range from 0.1 to 2  $\mu\text{m}$ .

6. A surface treated steel sheet for a battery case according to any one of claims 1 to 5, wherein the phosphorus content in the nickel-phosphorus alloy is within a range from 1 to 12% by weight.

7. A surface treated steel sheet for a battery case, in which a diffusion layer of a nickel-cobalt-phosphorus alloy is formed at the surface on the inner side of the battery case.

8. A surface treated steel sheet for a battery case in which an iron-nickel diffusion layer is formed as a lower layer and a diffusion layer of a nickel-cobalt-phosphorus alloy is formed as an upper layer at the surface on the inner side, and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer at the surface on the outer side of a battery case.

9. A surface treated steel sheet for a battery case in which an iron-nickel diffusion layer is formed as a lower layer, a nickel layer is formed as an intermediate layer, and a diffusion layer of a nickel-cobalt-phosphorus alloy is formed as an upper layer at the surface on the inner side, and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer at the surface on the outer side of the battery case.

10. A surface treated steel sheet for a battery case according to any one of claims 7 to 9, wherein the thickness of the nickel-cobalt-phosphorus alloy is within a range from 0.1 to

2  $\mu\text{m}$ .

11. A surface treated steel sheet for a battery case according to any one of claims 7 to 10, wherein the cobalt content is within a range from 5 to 30% by weight and the phosphorus content is within the range from 1 to 12% by weight in the nickel-cobalt-phosphorus alloy.

12. A battery case in which a diffusion layer of a nickel-phosphorus alloy is formed on the inner side.

13. A battery case in which an iron-nickel diffusion layer is formed as a lower layer and a nickel-phosphorus alloy layer is formed as an upper layer on the inner side and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer on the outer side.

14. A battery case in which an iron-nickel diffusion layer is formed as a lower layer, a nickel layer is formed as an intermediate layer and a nickel-phosphorus alloy layer is formed as an upper layer on the inner side and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer on the outer.

15. A surface treated steel sheet for a battery case according to any one of claims 12 to 14, wherein the diffusion layer of the nickel-phosphorus alloy contains  $\text{Ni}_3\text{P}$ .

16. A surface treated steel sheet for a battery case according to any one of claims 12 to 15, wherein the phosphorus content in the nickel-phosphorus alloy is within a range from 1 to 12%

by weight.

17. A battery case in which a diffusion layer of a nickel-cobalt-phosphorus alloy is formed on the inner side.

18. A battery case in which an iron-nickel diffusion layer is formed as a lower layer and a diffusion layer of a nickel-cobalt-phosphorus alloy is formed as an upper layer on the inner side and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer on the outer side.

19. A battery case in which an iron-nickel diffusion layer is formed as a lower layer, a nickel layer is formed as an intermediate layer and a diffusion layer of a nickel-cobalt-phosphorus alloy is formed as an upper layer on the inner side and an iron-nickel diffusion layer is formed as a lower layer and a nickel layer is formed as an upper layer on the outer side.

20. A surface treated steel sheet for a battery case according to any one of claims 17 to 19, wherein the cobalt content is within a range from 5 to 30% by weight and the phosphorus content is within a range from 1 to 12% by weight in the nickel-cobalt-phosphorus alloy.

21. A battery case according to any one of claims 12 to 20, which is obtained by a drawing forming method, DI forming method or DTR forming method.

22. A battery using a battery case according to any one of

claims 12 to 21 and filling a positive electrode active substance and a negative electrode active substance to the inside of the battery case.